Symposium Overview

Rosalie T. Ruegg

This collection of papers relates to the evaluation of the Advanced Technology Program (ATP), the nation's civilian technology program charged with improving the competitiveness of U.S. businesses. The program accomplishes its mission by sharing the costs with industry of particularly challenging research projects that are expected to accelerate the development and commercialization of enabling technologies with strong potential for generating broad-based benefits to the nation.

The Economic Assessment Office (EAO) of the Advanced Technology Program seeks to measure the economic impacts of ATP's funding of high-risk, enabling technologies, and also to increase understanding of underlying relationships between technological change and economic phenomena so as to further the ability of the program to achieve its mission. To this end, the EAO compiles data, conducts economic studies, and commissions studies by outside research organizations and economists on the economic issues related to the projects it funds.

Evaluation has been practiced by the ATP from its inception, first as a management tool for the program and later to meet the mandated requirements of the Government Performance and Results Act (GPRA). As emphasized in a previous issue of the *Journal,* "Science and Technology (S&T) and Research and Development (R&D) programs are required as never before to regularly demonstrate the relevance and value added of their programs" (Jordon 1997, p. 3). Indeed, the ATP has met nearly continuous demand for measures of impact of the program since the day it was established. It is probably the most highly scrutinized program relative to its budget size of any government program to date. Yet the ATP funds long-term research projects, most of which are still in the research phase. It funds research underlying the development of enabling technologies which are expected to have benefits extending substantially beyond the direct ATP award recipient. Technology diffusion takes time under the best of circumstances, and tracking and measuring externalities, or spillover effects is complicated and difficult. Available evaluation tools are insufficient to that challenging task.

Despite inherent methodological and measurement challenges, the ATP's evaluation efforts are yielding improved methods and tools of analysis, early progress indicators, and projections of long-term impacts. ATP economists are tracking progress throughout the lives of the projects it funds and into the post-project period, compiling in the process an extensive database that is used for portfolio profiling and economic analysis. Through a cooperative arrangement with the National Bureau of Economic Research, the ATP commissions studies by leading economists working in the field of technological change, and these studies are extending the state of the art in the field.

This special issue of the *Journal of Technology Transfer* features some recent ATP evaluation studies. Some were performed by economists in ATP's Economic Assessment Office; some by academics under contract to the ATP; and one by a consulting firm. The papers presented are selected to illustrate a variety of evaluation issues. A number of other evaluative studies are underway.

For background and perspective, the first paper, by Rosalie Ruegg of the Advanced Technology Program, provides an overview of the ATP. It explains how the program operates, how it seeks to accomplish its mission, and what it has funded to date. The paper identifies the major components of ATP's evaluation program, and identifies research areas of particular interest to the evaluation program. Because the ATP is a much misunderstood program, this paper seeks to provide a basis for clearer understanding of its rationale and guiding principles.

The second paper, by Adam Jaffe of Brandeis University, reflects the importance to the ATP of generating and measuring economic spillovers. It illustrates with simple models how the benefits of ATP projects may extend beyond the direct ATP award recipients through market and knowledge spillover effects, and also discusses network spillovers. Jaffe recommends that the ATP fund projects whose expected social benefits are large and substantially exceed expected benefits to the awardees; guidance which the ATP seeks to follow. He also recommends that evaluation efforts include measures of spillover effects. This paper is presented early in the collection because it contributes to the understanding of later papers that refer to spillover effects.

The third paper, by Jeanne Powell of the ATP's Economic Assessment Office, presents and analyzes data from ATP's "Business Reporting System" to evaluate short-and-medium-term project effects. The paper describes ATP's principal data collection tool, and identifies a number of pathways through which ATP-funded technologies are generating impact. The enabling nature of the funded technologies is suggested by the many potential applications that have thus far been identified.

A paper which examines ATP's effects on the speed with which research is conducted and technology is commercialized is provided by Frances Laidlaw, formerly an industry consultant with the ATP and now a technology planner with Motorola. Laidlaw's paper questions not only whether, and by how much, the ATP accelerates research, but also the value of acceleration; whether saving time during the research stage translates into saving time downstream; and whether project participants realize any time-related benefits outside the walls of the project. Accelera-

Journal of Technology Transfer Vol. 23 (2): 3–4.

tion of technology development and commercialization is of keen interest because it is part of the ATP's mission, and is one of several ways that the ATP can affect economic outcomes of the projects it funds.

The fifth paper in the collection, by Albert Link, an economics professor at the University of North Carolina at Greensboro, investigates the effects on research efficiency of collaboration in an ATP-sponsored joint venture. The project in question aimed to advance dramatically the technical capabilities of makers of printing wiring boards which provide the backbone of electronics products. His work also examines early productivity effects resulting from the new technical capabilities.

In the sixth paper, researchers at CONSAD Research Corporation report on a detailed case analysis performed for another research joint venture sponsored by the ATP, this one on new dimensional control technology for discrete manufacturing. It analyzes the multiple impacts of the new technology applied in the automobile manufacturing sector, and uses a macroeconomic model to project national economic impacts resulting from quality improvements in vehicles made by U.S. producers.

The seventh paper examines special considerations in modeling the social benefits of medical technologies. Prepared by Andrew Wang, an economist in ATP's Economic Assessment Office, the paper is inspired by a study conducted by economists at the Research Triangle Institute that is nearing publication. That study develops a framework for evaluating ATP-funded medical technologies, and applies the framework to project preliminary estimates of private, social, and public expected net benefits of seven tissue engineering projects funded by the ATP. Wang's paper provides a thoughtful exposition of several of the key concepts employed by the RTI study to estimate spillover benefits to patients who receive more effective, less painful, or less costly treatments as a result of the new tissue engineering technologies.

The last paper in the collection, by ATP economist Connie Chang, signals ATP's interest in counterpart programs to the ATP that are operated in most other industrialized countries. She shows similarities and differences in the programs by dissecting their design features. The ATP requires a detailed understanding of these other programs in order to take advantage of their evaluation programs in terms of the implications for the ATP. This understanding is also needed by the ATP to implement its Congressionally required evaluation of eligibility of U.S. subsidiaries of foreign-owned companies to participate in the ATP.

Many additional evaluation studies of the ATP are currently underway on a variety of topics. Most of this work will be reported in ATP publications, as well as in journals such as this. ATP welcomes comments and advice from the evaluation community on ways to improve the modeling and analysis of economic benefits from the advanced technologies it funds.

Rosalie T. Ruegg
Special Issue Editor
Director, Economic Assessment Office
Advanced Technology Program

Reference

Jordon, Gretchen B. "Symposium Overview." *Journal of Technology Transfer* vol. 22, no. 2, Summer 1997, pp. 3–4.